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ABSTRACT

Rules were established, improved behavior was rewarded, and undesirable behavior was ignored to change disruptive classrcom behavior of 25 slow learning 10-year-olds and 13 controls in a classroom setting. Experimental teachers were instructed in application of behavior modification principles. Burk's Behaviour Rating Scale (included) was used to pinpoint target behavior of Ss, and parents were surveyed to obtain information on behavior of slow learners during the experimental period. Four rules established with student participation included putting up hands to talk, staying at desks to work quietly, refraining from interrupting the teacher, and refraining frcm interrupting the class. Reinforcement was in the form of free time during the last period of the school day. Data showed a significant decline in the recorded means of unacceptable behaviors for both groups during the experimental period, but the contrcl group mean was significantly lower according to both pretest and posttest data. (Author/MC)

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A RESEARCH REPORT

THE USE OF BEHAVIOUR MODIFICATION TECHNIQUES IN A CLASS OF SLOW LEARNERS

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FRONTENAC COUNTY BOARD OF EDUCATION
329 JOHNSON STREET
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RESUMÉ

TITLE: The Use of Behaviour Modification Techniques in a Class of Slow Learners

AUTHORS: Kan Advani, Ph.D.
Eugene Beaumaster, M.A., Dip.Psych.

DATES: October 1972

ABSTRACT: An attempt was made to change the disruptive behaviour of elementary class children by the use of behaviour modification techniques: RULES, PRAISE and IGNORANCE. Twelve children from a class of 25 slow learners served as the Experimental group while 13 remained as the Control group. At the commencement of the experimental period four rules were established with the help of the students themselves to improve the academic atmosphere in the classroom. Free time during the last period of the school day was used as a positive reinforcer. A trend analysis performed on the behavioural data obtained from the Experimental group over the experimental period indicated a significant difference ($p < .01$) in the number of recorded unacceptable behaviours. Correlated t- tests were: Experimental group: $t = 5.835$ ($df = 10$, $p < .005$, one tailed). Control group: $t = 4.111$ ($df = 11$, $p < .01$, one tailed). Both group means declined significantly therefore from the pre to the post experimental period, but the control group mean was significantly lower than the experimental on both occasions.

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Mr. Paul Robb, teacher of Control group, and
Mr. Clyde Macfarlane, principal, Robert Meek Public School, Kingston, for their contribution.

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And Mrs. Jill Dodd for typing this manuscript.

Kan & Eugene

PREFACE

Behaviour problems appear to be on the increase among elementary school pupils. Not only does there appear to be a significant increase in incidence but also an increase in the number of pupils with more severe problems. Many teachers are asking what they can do to improve their management techniques with these difficult pupils. The behaviour modification technique can be used to advantage in a laboratory setting. Can it be used by a teacher and an assistant in an ordinary classroom situation? Can experimental techniques learned in such a situation be applied in a regular classroom?

Dr. Advani and his associates used a group of pupils who had behaviour problems and set up an experiment to apply modification techniques in a classroom situation. The experimental group was paired with a control group so that progress of the four week experiment could be evaluated. The techniques of observation, recording, rewarding improved behaviour and ignoring undesirable behaviour produced the desired results. From the lessons learned in the application of these methods in this experiment, others may gain some insight into how to improve the management of their pupils with behaviour problems.

G. R. Locklin,
Superintendent of
Educational Services.

INTRODUCTION

The results of a decade or so of research have documented the effectiveness of the behaviour modification approach in a wide variety of settings, with very diverse child populations (O'Leary & O'Leary, 1972, p. 13). In the recent years there has been a greater emphasis on the systematic use of reinforcement procedures involved in the analysis of classroom behaviours. These principles are extensions and applications of earlier research in the techniques of operant conditioning (Skinner, 1938, 1953). Skinner's work provided impetus for a vast body of laboratory research, primarily with infra-human organisms (Journal of Experimental Analysis of Behavior, 1957) which has led to much of present applied research in educational settings. These studies have concentrated on both academic, i.e., study behaviour, development of skills such as reading, spelling and arithmetic; and nonacademic behaviours. Improvement in a certain nonacademic behaviour may lead to improvement in academic behaviour.

Technologically, changing problem behaviour may not be considered different from academic subject because the success in both areas requires arranging conditions and contingencies of reinforcement to expedite learning.

In the special classroom settings the behaviours studied most often have been disruptive behaviours, academic achievement, hyperactivity and mutism. Tantrums have been reduced by using candy and stars contingent on appropriate behaviour. Loss of free recess time has been used to reduce a disruptive, obscene classroom gesture. Kuypers, Becker and O'Leary (1968) attempted to modify a large range of inappropriate class-

room behaviour. Improved study or task oriented behaviour has been reported for underachievers and retardates (Walker & Buckley, 1968; McKenzie, Clark, Wolfe, Kothera & Benson, 1968; Zimmerman, Zimmerman & Russel, 1968; Watson 1967 & 1970).

Most of the problems in the special classroom are often found in the normal and regular classroom situation. A wide range of disruptive behaviours that interfere with education in a regular classroom have been reduced by using contingent teacher attention, rules paired with praise for following the rules, and tokens contingent on appropriate conduct (Hanley, p. 602).

The behaviour modification techniques have also been successful in changing hyperactive behaviours which are often considered organic (Patterson, 1965). The behaviour of delinquents has been vastly changed thus reducing the frequency of arrests and incarceration (Cohen, 1967: Schwitzgebel, 1964).

PURPOSE OF THE STUDY

To change the disruptive behaviour of elementary class children (SLOW LEARNERS) by the use of Behaviour Modification Techniques: RULES, PRAISE & IGNORING.

METHOD

SUBJECTS

Twelve children of the Experimental group were drawn from the class of 25 slow learners at Robert Meek Public School, Kingston. The classroom teacher of that class served as the teacher of the Control group while the Special Education Resource Teacher, who had been working with all of these students for some time during the day, took charge of the Experimental group. It was left up to these two teachers to make the selection of the students so that the normal timetable will not be affected in any way.

The age range of Experimental class was 10; the Contrast class was 10.2.

In the Experimental class there were 8 boys and 4 girls while in the Control group there were 5 boys and 8 girls.

SETTING

The school is located in the low income area of the historical city of Canada. It has a total enrollment of 152 boys and 129 girls. The school has one Special Class for the Educable Mentally Retarded children and a class for Slow Learners.

PERSONNEL

The following personnel were responsible for the project:

Dr. Kan Advani - Educational Services Consultant. Ph.D. in the Education and Psychology of Exceptional Children. Sixteen years of teaching and supervisory experience with the children with learning disabilities, visual, physical and mental handicaps.

Mr. Eugene Beaumaster - Ph.D. student (queen's). M.A., Diploma in Clinical Psychology. Has experience of working with chronic inpatients, retarded, chronic psychotics at the Kingston Psychiatric Hospital, and was involved in behaviour modification programs for three summers. Had clinical training with inpatients of Kingston General Hospital. Has been involved in several research projects in psychology.

Miss Joyce Moulton - Student at St. Lawrence College of Applied Arts and Technology, Kingston in Behavioral Sciences Technologist Course.

Mr. George E. Bullock - Student at St. Lawrence College of Applied Arts and Technology, Kingston in Behavioral Sciences Technologist Course.

Mrs. D. Leonard - (Experimental Group) Special Education Resource Teacher, Robert Meek Public School.

Mr. Paul Robb - B.A.,(Control Group) Teacher, Class of Slow Learners.

Mr. A. C. Macfarlane - B.A., Principal, Robert Meek Public School.

SCHEDULE

The study took place during the month of October 1972. Following schedule was followed:

October 2

9:00 a.m. Preparing pre-experimental summary of the behaviours reported by the teachers of the Experimental and Control groups on the "Burk's Rating Scale".

12:05 p.m. Meeting with the Principal, teachers and personnel participating. Outline the purpose and procedure.

1:30 p.m. Pinpoint the target behaviours of the individual students. Only three apparent maladaptive behaviours per child.

October 3

9:00 a.m. Setting up the classrooms.

Meet the students and explain: Nature and purpose of the study; role of the Recorders who will be sitting in the back of the room with a clipboard, stopwatch, Rating Sheet and a Noise Level Meter; their responsibility and participation in the study.

October 4, 5 and 6

Baseline Period

October 9

First day of the Experimental Period.

Chat with the students in the Experimental Group.

Setting up rules for the class with the help of the students.

October 9 - 24 = 11 days

Experimental Period

October 25, 26 and 27

Postexperimental Observation Period.

INSTRUCTIONS FOR THE EXPERIMENTAL TEACHER

After having collected the pre-experimental period data the experimenters had a session with the teacher of the experimental group and discussed the following principles of behaviour modification to be applied in the class.

DO'S and DONT'S

Certain behaviours are to be IGNORED. Learning to ignore is rather difficult. Do not pay attention to violation. Statements like the following should be avoided:

"Doug, will you stop bothering your neighbours."

"Ben, can you keep your hands off Bill."

"Will you please sit down."

"Stop running around and do your work."

"Will you please stop scribbling on your paper."

"You know you are supposed to be working."

Behaviour which include motor behaviour should also be ignored:

e.g. getting out of seat

standing up

running around

moving around

sitting in contorted manner

Also ignore any verbal comment or noise not connected with the assignments -

carrying on conversations with other children when it is not permitted;

making remarks when no questions have been asked;

answering questions without raising hands or asking permission;

laughing loudly, calling your name to get 'attention'; whistling, coughing and all extraneous noises

Also ignore the child when he ignores your instructions, when he makes noises with materials, or disturbs another student by turning around and touching him or grabbing him.

PRAISING

"CATCH THE CHILD BEING GOOD" and make a comment to reward him for the good behaviour.

Give praise and attention at the first signs of APPROPRIATE BEHAVIOUR. Watch the difficult child carefully and when you see him giving acceptable behaviour, comment, "John you are doing a fine job." Your commendation and praise are important to the child.

Some examples of praise comments are as follows: (Don't forget to use his name frequently)

"I like the way you are doing your work quietly."

"That is a very good job."

"You are certainly doing fine."

"That is exactly the way I like to see you work."

Also praise the child if -

he raises his hand before talking,

paying attention to directions,

sitting in desk and doing work.

Try to bring variety and expression in your comments.

The need of immediacy, consistency and contingency in reinforcement therapy was stressed.

No change was suggested in the academic programming of the children. The teacher was to carry on her routine work as usual.

THE BURK'S BEHAVIOUR RATING SCALE

The Burk's Behaviour Rating Scale (Fig. 1) was used in this study to pinpoint the target behaviours of the subjects. This scale is widely used as one of the basic instruments for the referral, screening and placement of children in special classes in many districts in California.

(Hotchkiss, 1971)

The scale consists of three sections:

(1) Vegetative-Autonomic

e.g., hyperactiveness, restlessness, erratic, explosive behaviour:

(2) Perceptual-Discriminative

e.g., poor in reading, confusion in writing and spelling; and

(3) Social-Emotional

e.g., demanding much attention, shallow feeling, cries, etc.

Fig. 1

BURK'S BEHAVIOUR RATING SCALE

Name _____ Age _____ Grade _____

Teacher _____ School _____ Date _____

Please rate each and every statement by putting an "X" in the appropriate square after the statement. The squares are numbered from 1 to 5 and represent the degree to which you have noticed the described behaviour. The basis for making a judgement are given below:

1. You have not noticed this behaviour at all.
2. You have noticed the behaviour to a slight degree.
3. You have noticed the behaviour to a considerable degree.
4. You have noticed the behaviour to a large degree.
5. You have noticed the behaviour to a very large degree.

	1	2	3	4	5
VEGETATIVE-AUTONOMIC					
1. Hyperactive and restless					
2. Erratic, flighty, or scattered					
3. Easily distracted, lacks continuity of effort and perseverance					
4. Behaviour goes in cycles					
5. Quality of work may vary from day to day					
6. Daydreaming, alternating with hyperactivity					
7. Explosive and unpredictable behaviour					
8. Cannot seem to control self (will speak out or jump out of seat)					
9. Poor coordination in large muscle activities (games, etc.)					
PERCEPTUAL-DISCRIMINATIVE					
10. Confusion in spelling and writing					
11. Inclined to become confused in number processes, given illogical responses					
12. Reading is poor					
13. Lacks a variety of responses, repeats himself in many situations					
14. Upset by changes in routine					
15. Confused in following directions					
16. Confused and apprehensive about rightness of responses, indecisive					
17. Classroom comments are often "off the track" or peculiar					
18. Difficulty reasoning things out logically with others					
SOCIAL-EMOTIONAL					
19. Demands much attention					
20. Tends to be destructive especially of the work of others					
21. Many evidences of stubborn uncooperative behaviour					
22. Often withdraws quickly from group activities, prefers to work by self					
23. Constant difficulty with other children and/or adults (apparently purposeless)					
24. Shallow feeling for others					
25. Cries often and easily					
26. Often more confused by punishment					
27. Seems generally unhappy					
28. Often tells bizzare stories					

THE PARENT QUESTIONNAIRE

A questionnaire (Fig. 2) was designed to obtain the information about the behaviour of the experimental group children during the experimental period.

Fig. 2

PARENT QUESTIONNAIRE

ROBERT MEEK PUBLIC SCHOOL

KINGSTON

Dear Parent:

During the past four weeks two St. Lawrence College students have been helping your child's teacher in the school. They have been working under the guidance of Dr. Kan Advani, Educational Services Consultant for the Board of Education. We wish to find out if, during these four weeks, you have noticed any change in the behaviour of your child. Will you please answer the following questions as fully as possible.

1. What changes in _____ behaviour have you noticed during the past four weeks?

   _____

2. During these four weeks did your child mention anything about the work of the St. Lawrence students? _____ If so, what?

   _____

3. Has your child developed any desirable types of behaviours recently? _____ If so, what are they?

   _____

4. Has your child shown any undesirable types of behaviours recently? _____ If so, what are they?

   _____

5. Please comment on the following:

   your child's (improvement if any)

   attitude toward school _____
   attitude toward parents _____
   attitude toward teachers _____
   attitude toward brothers & sisters _____

Any further information you would like to give us about your child. (Please use back of sheet)

Please return this form to the school as soon as possible. If you have any questions about this form, please feel free to call me at 548-7231.

Sincerely,

A. C. Macfarlane, Principal

PROCEDURE

At the commencement of the Experimental period four rules were established for a good academic atmosphere in the classroom. These rules were suggested by the students themselves. The attention of the students was drawn to these rules (which were on the blackboard) each morning and afternoon.

1. We should put up our hands when we want to say something.
2. We shall stay at our desks and work quietly.
3. We should not interrupt the teacher when she is talking.
4. We should not interrupt the class.

During the final three days of the study the teacher reverted to the teaching and control methods of the baseline period and students were informed that working towards free periods was at an end.

Sound levels were sampled during alternate mornings and afternoons in each group. Samples were taken at five minute intervals during the sampling periods. Only one group was sampled at a given time.

Table 1 & 2 show the summary of the Teacher's Rating of the student's behaviour on the Burk's Behaviour Rating Scale.

Table 1

TEACHER'S RATING OF THE EXPERIMENTAL GROUP

ON

BURK'S BEHAVIOUR RATING SCALE

N = 12

	1	2	3	4	5
VEGETATIVE-AUTONOMIC					
1. Hyperactive and restless	3	2	4	3	0
2. Erratic, flighty, or scattered	2	1	5	4	0
3. Easily distracted, lacks continuity of effort and perseverance	1	2	3	6	0
4. Behaviour goes in cycles	8	1	2	1	0
5. Quality of work may vary from day to day	2	5	4	1	0
6. Daydreaming, alternating with hyperactivity	5	1	4	2	0
7. Explosive and unpredictable behaviour	6	2	1	1	1
8. Cannot seem to control self (will speak out or jump out of seat)	4	2	3	0	3
9. Poor co-ordination in large muscle activities (games, etc.)	3	6	1	0	1
PERCEPTUAL-DISCRIMINATIVE					
10. Confusion in spelling and writing	0	4	5	1	1
11. Inclined to become confused in number processes, gives illogical responses	0	5	5	1	1
12. Reading is poor	1	4	5	1	1
13. Lacks a variety of responses, repeats himself in many situations	4	6	2	0	0
14. Upset by changes in routine	5	6	0	1	0
15. Confused in following directions	1	3	5	3	0
16. Confused and apprehensive about rightness of responses, indecisive	2	6	4	0	0
17. Classroom comments are often "off the track" or peculiar	2	6	2	2	0
18. Difficulty reasoning things out logically with others	0	7	2	2	1

SOCIAL-EMOTIONAL	1	2	3	4	5
19. Demands much attention	2	3	4	1	2
20. Tends to be destructive especially of the work of others	6	4	2	0	0
21. Many evidences of stubborn uncooperative behaviour	3	3	3	3	0
22. Often withdraws quickly from group activities, prefers to work by self	6	4	1	0	0
23. Constant difficulty with other children and/or adults (apparently purposeless)	4	3	2	2	0
24. Shallow feeling for others	7	1	3	0	0
25. Cries often and easily	8	2	1	0	0
26. Often more confused by punishment	7	2	2	0	0
27. Seems generally unhappy	7	3	1	0	0
28. Often tells bizarre stories.	5	5	1	0	0

Table 2

TEACHER'S RATING OF THE CONTROL GROUP

ON

BURK'S BEHAVIOUR RATING SCALE

N = 13

VEGETATIVE-AUTONOMIC	1	2	3	4	5
1. Hyperactive and restless	5	6	2	0	0
2. Erratic, flighty, or scattered	5	5	2	1	0
3. Easily distracted, lacks continutiy of effort and perseverance	3	6	3	1	0
4. Behaviour goes in cycles	11	1	1	0	0
5. Quality of work may vary from day to day	8	2	2	1	0
6. Daydreaming, alternating with hyperactivity	10	1	0	2	0
7. Explosive and unpredictable behaviour	10	2	1	0	0
8. Cannot seem to control self (will speak out or jump out of seat)	9	3	1	0	0
9. Poor coordination in large muscle activities (games, etc.)	3	6	4	0	0

PERCEPTUAL-DISCRIMINATIVE	1	2	3	4	5
10. Confusion in spelling and writing	5	4	5	0	0
11. Inclined to become confused in number processes, gives illogical responses	7	4	2	0	0
12. Reading is poor	0	8	5	0	0
13. Lacks a variety of responses, repeats himself in many situations	7	6	0	0	0
14. Upset by changes in routine	10	3	0	0	0
15. Confused in following directions	6	6	1	0	0
16. Confused and apprehensive about rightness of responses, indecisive	8	4	1	0	0
17. Classroom comments are often "off the track" or peculiar	9	3	1	0	0
18. Difficulty reasoning things out logically with others	8	3	2	0	0
SOCIAL-EMOTIONAL					
19. Demands much attention	5	4	2	2	0
20. Tends to be destructive especially of the work of others	12	1	0	0	0
21. Many evidences of stubborn uncooperative behaviour	9	2	1	1	0
22. Often withdraws quickly from group activities, prefers to work by self	8	1	2	2	0
23. Constant difficulty with other children and/or adults (apparently purposeless)	8	3	1	0	0
24. Shallow feeling for others	12	0	0	0	0
25. Cries often and easily	12	1	0	0	0
26. Often more confused by punishment	13	0	0	0	0
27. Seems generally unhappy	10	2	0	0	1
28. Often tells bizzare stories	11	1	1	0	0

Table 3 gives the summary of the target behaviours selected for manipulation by the experimental procedures.

Table 3

TARGET BEHAVIOURS OF THE EXPERIMENTAL CLASS

Behaviour	Exper. Group N	Control Group N
Hyperactive and restless	4	6
Erratic, flighty, or scattered	1	-
Easily distracted, lacks continuity of effort	8	9
Daydreaming, alternating with hyperactivity	2	3
Explosive and unpredictable behaviour	2	-
Cannot seem to control self	4	1
Confused in following directions	1	5
Confused and apprehensive about rightness of responses, indecisive	1	2
Classroom comments are often "off the track" or peculiar	1	-
Difficulty reasoning things out logically with others	1	2
Demands much attention	8	10
Many evidences of stubborn uncooperative behaviour	3	-
Often withdraws quickly from group activities, prefers to work by self	-	1
	36	39

Two raters were used in the study, one full time in each class. Daily records of the target behaviours were kept using a Special Form (Fig. 3).

No measure of reliability was obtained but an attempt was made to maximize consistency of ratings by selecting behaviours for observation that were as clearcut as possible. Where it was felt that some vagueness existed concerning

the definition of a given behaviour, the raters were asked to discuss these and arrive at a common definition.

REINFORCEMENT

Free time during the last period of the school day was used as a positive reinforcer. Those who qualified for the free time participated in the following activities supervised by the two recorders:

- watching films of their own choice
- baking cookies and cakes
- playing in the gym or outside

Fig. 3

TARGET BEHAVIOUR RATING FORM

CONTROL _____ EXPERIMENTAL _____ DATE _____

✓ = No occurrence
1 = For each time behaviour occurs TIME _____

NAME _____ BEHAVIOUR _____

A _____
B _____
C _____

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90

Sound Level

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90

DESIGN OF THE STUDY

Students were randomly assigned to the groups within the limitations of a decision to retain sub-groups based on reading levels rather than to risk hindering the academic development of the students during the experimental period.

The school day was divided into five minute observation periods for the purpose of determining success or failure in meeting the behavioural requirements for the day. The number of such periods during which each of the designated behaviours occurred was the focus of the study. These periods were to be scored whether the behaviour occurred once or several times during the five minute period.

The mean number of these periods during which each selected behaviour was observed during the three baseline days was set as the initial level to be reached by the student concerned. These levels were set for each of the three target behaviours independently on the first day of the experimental period.

During the experimental period the following criteria were used to determine reinforcement. If the number of five minute periods during which the selected behaviours were observed did not exceed the present level on any of the three variables concerned, the student was allowed a reinforcement period. He was allowed to spend the final period of the day out of the classroom involved in special activities such as gym, films, trips, etc. If any one of the three present limits was exceeded, the child remained in the classroom. He was told the reason for his failure and classwork was carried on as usual.

On the day following a reinforcement period the standards for success were made more stringent. The new requirement for success on any behaviour where the previous criterion had exceeded ten scored occurrences, was revised downward by a factor of two five minute periods. Behaviours concerning which the previously acceptable number of occurrences had been ten or less were revised downward by one five minute period. This reduction was not carried below two scored occurrences for each behaviour.

Pupils were not told explicitly about the design. They were merely told which behaviours they must try to improve and were not informed of success or

failure until the reinforcement period arrived.

The final three days of the study constituted second nonreinforcement period during which persistence of improved behaviour was the object of interest.

RESULTS

The final daily figures for each student, used in all of the analysis were obtained as follows. The number of scored unacceptable behaviours was summed for each of the three selected behaviours independently. These three sub-totals were then added to produce the total for the day. Where these totals were based on an observation period of less than a full day, prorated figures were used in an attempt to compensate for unequal observation times. Analyses of data from the Experimental group were based on eleven students. One who was frequently absent was eliminated.

An itial uncorrelated t-test for unequal variances was performed comparing scores obtained from the two groups during the baseline period. The data used were mean total scores obtained from each student during the three day period. The mean totals were 60.26 and 29.18 for the experimental and control groups respectively. This yielded a t value of 3.204 ($df=21$, $p<.005$, one-tailed).

This result indicates that the Experimental group showed a significantly greater frequency of occurrence of undesirable behaviours than the control group before the experimental period began (see Fig. 4). This is probably due to the decision to retain reading groups, resulting in a greater concentration of students with more behaviour problems in the Experimental group.

Since the behaviour of the groups was significantly different to begin with, it was decided to analyse the changes in behaviour over the experimental period separately for the two conditions of the study.

A trend analysis was performed on the behavioural data obtained from the Experimental roup over the eleven day experimental period. The results are summarized in Table 4. The trials effects was significant ($p.<.01$) indicating that there were significant differences in the number of recorded unacceptable behaviours over this period. (Fig. 4). In order to specify more clearly the nature of these differences the linear and quadratic components of the curve were examined separately and both proved to be highly significant. (Table 4) Thus there was both a general decline in scores over days as well as a significant change in the rate of decline. Inspection of figure 4, suggests that improvement in behaviour had reached its maximum level by the sixth experimental day. Thereafter no further improvement was apparent although variability from day to day appeared to decrease.

Table 4

Summary of trend analysis of behavioural data obtained over the 11 day experimental period from the experimental group.

	Source	Sum of Squares	Degrees of Freedom	Mean Square	F
	(S) Subjects	46856	10		
	(T) Trials	29487	10	2948.7	8.73 *+
T Components	(a) Linear	11703	1	11703	34.66 **+
	(b) Quadratic	5340	1	5340	15.82 **+
	(c) Other	12445	8	1556	4.61 NS+
	SXT	33762	100	337.62	
	Total	110105	120		

* $P < .05$

** $P < .01$

NS = Not Significant

\+ Conservative F test - Edwards A.L. 1967 p. 318

A trend analysis was also performed on the behavioural data obtained from the Control group. Data was available for only ten days since this group was absent on one of the scheduled experimental days. Results of the analysis are summarized in Table 5.

Table 5

Summary of trend analysis of behavioural data obtained over a ten day experimental period from the control group.

Source		Sum of Squares	Degrees of Freedom	Mean Square	F
(S) Subjects		7078	12		
(T) Trials		10142	9	1127	17.23 **+
T Components	(a) Linear	131	1	131	2.01 NS
	(b) Quadratic	270	1	270	4.13 *
	(c) Other	9741	7	1392	21.28 **+
SXT		6868	105	65.41	
Total		24087	126		

NS = Not Significant

* $P < .05$

** $P < .01$

\+ Conservative F test - Edwards, 1967, p.318

\# Analysis was adapted for unequal ns-(Gaito, 1965)

The trials effect was highly significant indicating that there were reliable differences over days in the mean scores obtained. When the components of the curve were analysed separately however, no significant linear trend was found. This indicates that there was no consistent increase or decrease in the scores obtained from the beginning to the end of the "Experimental" period (Fig. 4). The significant differences in means are accounted for by higher order components which do not appear to be related in any regular fashion to the order of the trials. There is no evidence therefore that elapsed time during the "Experimental" period is related to a decrease in the observed number of undesirable behaviours in the control group.

The experimental and control groups were also compared with regard to mean number of unacceptable behaviours recorded during the three day postexperimental period. Means for the control group were based on data from two days. The obtained means were 24.26 and 14.42 for the experimental and control groups respectively (Fig. 4). An uncorrelated t-test for equal variances was performed which indicated that the groups were still significantly different following the experimental period ($t = 7.32$, $df = 21$, $p < .005$, two-tailed).

Correlated t-tests were performed comparing observed frequency of undesirable behaviours in the baseline and postexperimental periods for both groups. Both groups had significantly lower means during the post-experimental period. For the experimental group $t = 5.835$ ($df = 10$, $p < .005$, one-tailed). For the control group $t = 4.111$ ($df = 11$, p .01, two-tailed). Both group means declined significantly therefore from the pre to the postexperimental period, but the control mean was significantly lower than the experimental on both occasions.

Figure 4.

Mean numbers of unacceptable behaviours observed throughout the study for the Experimental and Control Groups.

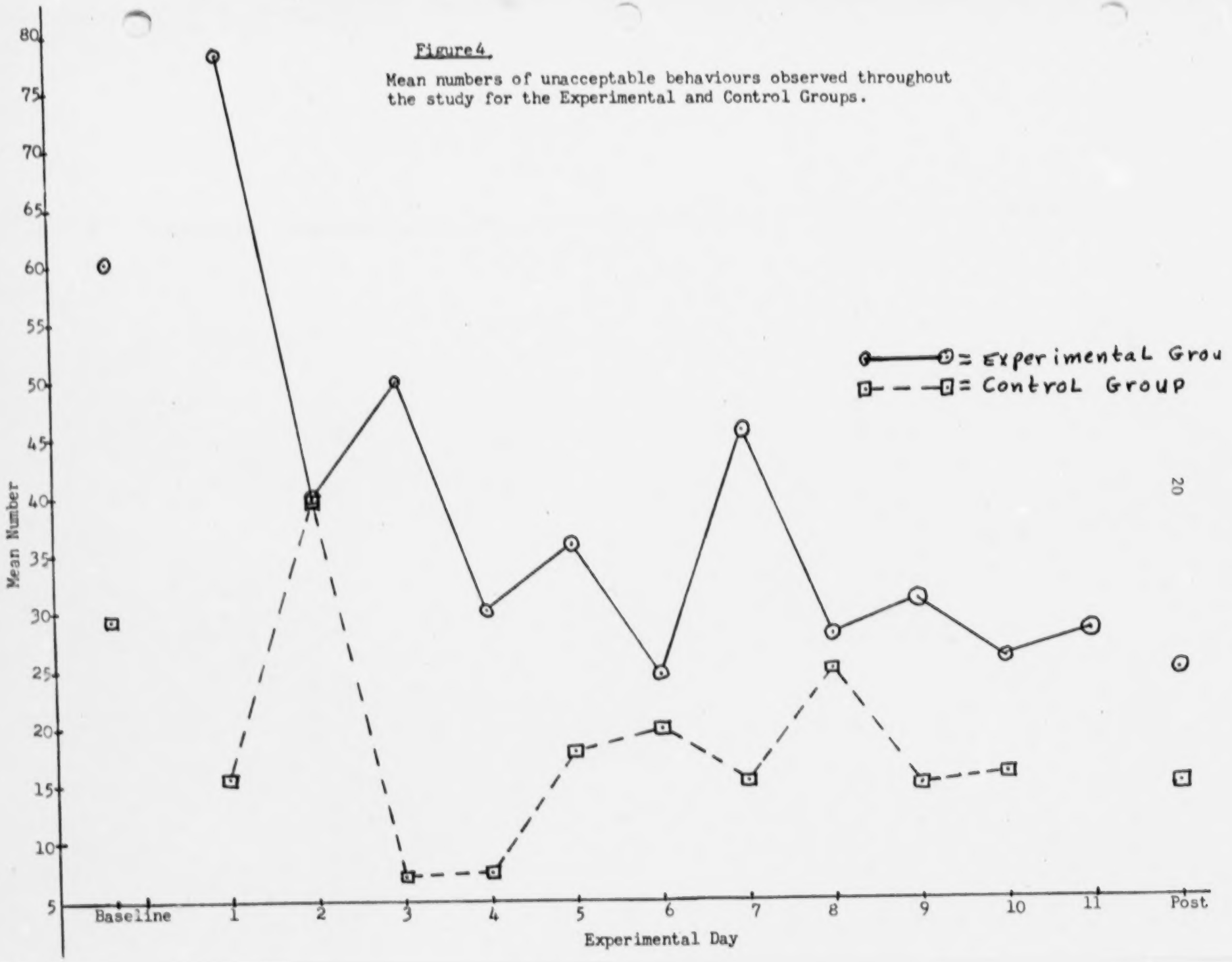
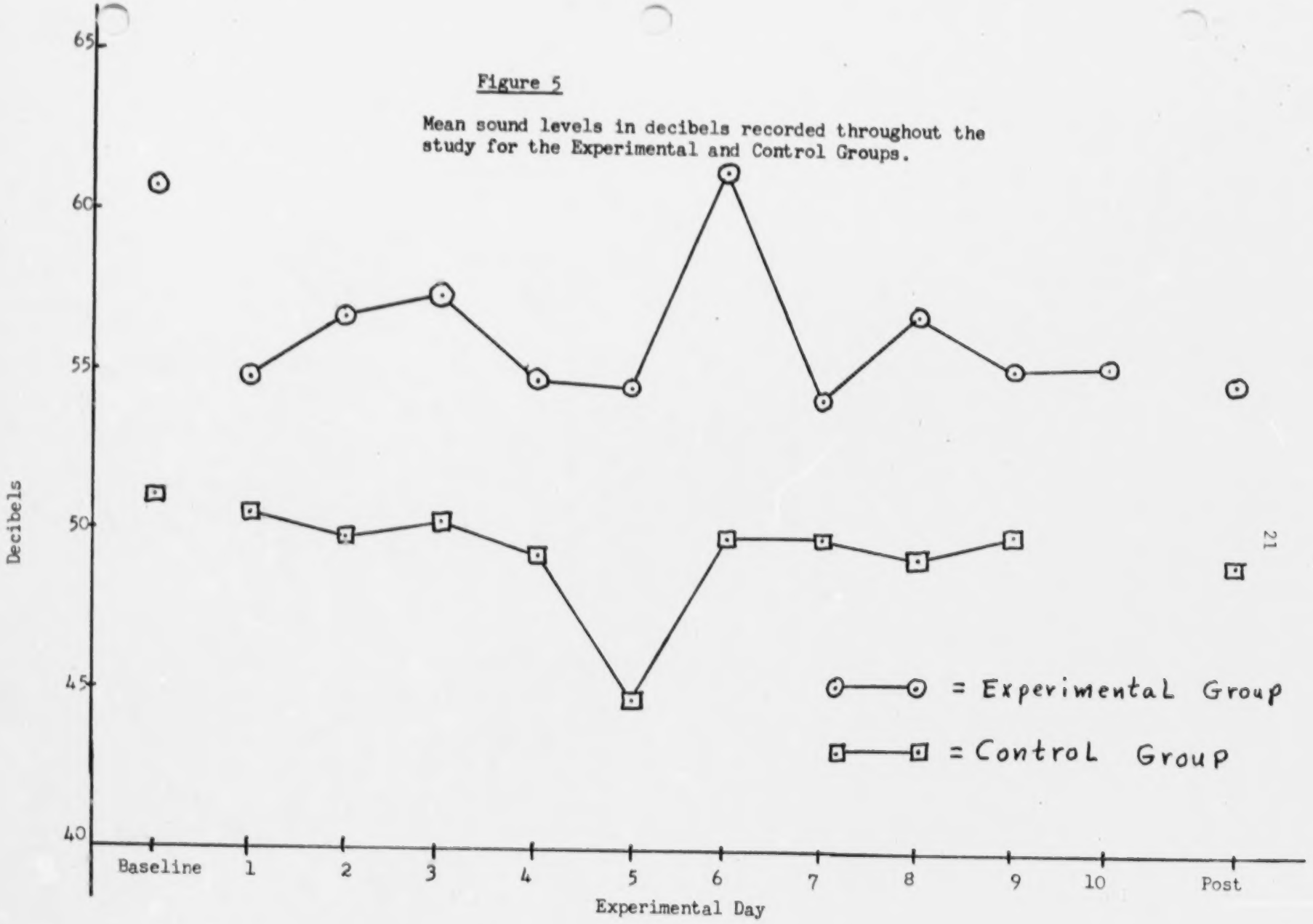


Figure 5

Mean sound levels in decibels recorded throughout the study for the Experimental and Control Groups.



PARENT QUESTIONNAIRE

Six parents of the children in the Experimental group returned the questionnaire.

Question: "What changes in your child's behaviour have you noticed during the past four weeks?"

Answer: Four parents said that they did notice some improvement in the behaviour and attitude of their children. One parent wrote, "He has been awful moody and quite upset about something, I don't know what is bothering him."

Question: "During these four weeks did your child mention anything about the work of the St. Lawrence students?"

Answer: Two parents replied in affirmative and two said 'No', two did not reply.

The following is the summary of the parents' comments on their child's attitude:

Toward School

Better	2
Good	1
Same	1
Doesn't like very much	1
No response	1
	6

Replying to the question, "Has your child developed any desirable types of behaviours recently? If so, what are they?" One parent replied, "As I said before, he is quieter, but he still doesn't do anything for nothing, if he goes to the store he has to be paid."

Sound levels recorded from the Experimental group were generally lower following the baseline period than during it (see Fig. 5). This improvement seems to have occurred immediately after the reinforcement contingency was instituted and persisted during the postexperimental period. Inspection of Figure 5 indicates that there was no consistent change in sound levels recorded from either group following the beginning of the experimental phase of the study. Sound levels recorded from the control group, however, were consistently lower throughout the study.

DISCUSSION

Since the two groups were significantly different in observed rates of undesirable behaviours to begin with, comments concerning the relative effectiveness of the two behaviour control methods used in the study can only be of a suggestive nature.

Both groups showed improvement in behaviour from the baseline to the post-experimental period.

The statistical results suggest that this improvement occurred rather suddenly in the Control group following the baseline period, since they did not show any decline in mean scores during the experimental period or following it. This result might be explained in the absence of a change in the teacher's methods following the baseline period, by assuming that the students were initially "disturbed" by the novelty of suddenly finding themselves in a smaller class with a strange adult (the rater) constantly present in the room; but adapted rather quickly and behaviour returned within a few days to its normal levels. It is also possible that baseline behaviour levels were a relatively good indicator of the childrens' previous behaviour, but that with more individual attention in a smaller class, the usual methods of behaviour control

were quickly effective in reducing the occurrence of unwanted behaviour. The failure to find increased improvement over the experimental period in this group, might be explained by assuming that a near asymptotic level of behaviour control had already been attained.

The argument of initial "disturbance" followed by a decline in undesirable behaviour could be applied to the Experimental group as well. If this explanation is correct the data indicate much more "disturbance" in this group than in the control group, as well as a much slower return to normal patterns of behaviour. Since usual methods of behaviour control were not applied to this group, it seems very likely that at least part of the improvement was due to the reward contingencies.

In the short experimental period of the study it was not possible to test the limits of the experimental control, since the improved behaviour demanded by the design was relatively minute at each new level set, and new levels were set only following a reinforcement. A much more extended period would have been required to assess the limits of the control. It would appear from Figure 4 that during the present study maximum improvement was attained by the sixth experimental day. It would have been interesting to see whether this is the maximum improvement to be expected from the contingencies of the study, or if increasing demands for better behaviour would have led to a further gradual improvement.

It appears from the results that the method used with the Experimental group was successful in reducing the frequency of occurrence of undesirable behaviours, but because of the lack of a suitable control group it is not certain whether this improvement was significantly better than could have been attained using more traditional methods. In spite of the improvement in the Experimental group the behaviour of the Control group remained significantly better at the end of the study.

Sound levels in the classrooms seemed related to frequency of undesirable behaviour, in that the Experimental group with a higher frequency of such problems also showed consistently higher levels of noise (Fig. 5). The improvement in the behaviour of the Experimental group, however, did not seem to be related to a decrease in sound levels in the room. It is interesting to note, in fact, that the best day recorded in behavioural terms (day six of the experimental period) was associated with the highest level of recorded noise in this group.

Assuming that the method of control used in the present experiment is superior to traditional methods, many questions still remain as to how the approach might be simplified or modified so as to achieve the maximum result with a minimum of effort and complexity. A few variables that might be related to this problem of efficiency are: number and nature of the behaviours to be modified; length, number and distribution on reinforcement periods; immediate versus delayed feedback to the student; and size of the step function to be used in setting the criteria for reinforcement.

FOLLOW-UP

Encouraged by the successful results of this project two teachers of the Robert Meek Public School have been using these techniques and reinforcements with their groups of children.

SUGGESTIONS FOR FUTURE STUDIES

Several improvements could be suggested for future studies using the present design. It is essential that the groups to be compared be matched at least with regard to the variable of interest. A measure of reliability should be obtained.

This would require the presence of two raters, at least part time, in the rooms. Equal time should be spent by each teacher with each group. The experimental period should be considerably extended. Time of day factors, should be more carefully controlled by obtaining measures, such as sound levels, from the same period of the day and by counterbalancing for individual rater differences over the day.

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